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PSYCHE

VOL. XLVI

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A KEY TO THE MOSQUITOES OF MASSACHUSETTS

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During the summer of 1939 the Department of Public Health of the State of Massachusetts conducted a state-wide mosquito survey with the cooperation of the Works Projects Administration. This survey was one phase in the program of a study of the general problem of encephalitis. It was initiated following an outbreak of encephalitis in man in 1938 which was traced to the eastern virus of equine encephalomyelitis. The identification of biting mosquitoes was made by using a key compiled by Tulloch (1930) which was taken from Dyar (1922) and Matheson (1929) and modified to include those species reported from New England. The present key is a revision of the earlier one which has been enlarged to include the non-biting as well as the biting mosquitoes and is based on the examination of over 100,000 specimens. Although this key is restricted to the species which may be found in Massachusetts it is sufficiently inclusive for use in any of the New England states. It is accompanied by illustrations of many of the characters of taxonomic importance and by a summary of the species of Culicidae which have been taken in Massachusetts.

¹Grateful acknowledgment is made to the following for assistance: Dr. R. F. Feemster, Director, Division of Communicable Diseases, Massachusetts Department of Public Health; Dr. V. A. Getting, Technical Director, Massachusetts Mosquito Survey; Prof. J. C. Bequaert, Consulting Entomologist; V. A. Bell, R. P. Holdsworth, Jr., C. E. Elliott, Dr. B. W. Parker, Dr. J. W. Hawkins, G. C. Tower, H. D. Rose, and R. O. Bohm, Entomologists and to Mr. J. Milano for preparation of the plates.

The material for this key has been modified from the works of many authors, notably Smith (1903), Headlee (1921), Dyar (1922, 1928), Dyar and Shannon (1924), Matheson (1925, 1929), Bradley (1936), Edwards (1932), Johannsen (1903, 1923, 1934), Marshall (1938) and King, Bradley and McNeel (1939).

Mosquitoes are small two-winged insects belonging to the order Diptera, family Culicidæ. The Culicidæ are separated from all other Diptera by a characteristic wing venation which is outlined by Edwards (1932) as follows: Subcosta (Sc) long and reaching costa; radius 4-branched, R_{2+3} forked, R_{4+5} simple, no cross vein connecting R_1 and R_2 ; media two branched; cross veins r-m and m-cu both present; cubitus forked; anal vein long and reaching wing margin; axillary vein absent or very faint (Fig. 5). There is no other single character which separates the family from other Diptera. Other common family characters are (1) the small or rudimentary first antennal segment and the more or less enlarged second segment, (2) the completely divided pronotum, the posterior divisions of which appear to form part of the pleuræ. These characters, however, are not distinctive since they are shared by one or more families of Diptera.

The larvæ of the Culicidæ are distinguished from all other dipterous larvæ by the presence of a complete head capsule and of only one pair of functional spiracles situated dorsally on the eighth abdominal segment opening free to the surface (Fig. 19) or into an air tube or by the presence of a complete head capsule and air sacs in the thorax and seventh abdominal segment (Fig. 17) (*Chaoborus*).

KEY TO SUBFAMILIES OF CULICIDÆ

Adults

1. Antennal flagellum 14 segmented; vein Sc ending above or before base of Rs (Fig. 5). Mouthparts short, wings without scales: _____ *Dixinæ*
 Antennal flagellum 13 segmented; vein Sc ending much beyond base of Rs. Wings with scales at least on fringe _____ 2
2. Mouthparts short, palpi incurved; scales almost confined to wing fringe: _____ *Chaoborinæ*
 Mouthparts modified to form a long proboscis, palpi not incurved; wing veins and legs scaly: _____ *Culicinæ*

Larvæ

1. Thorax narrow with distinct segmentation; prolegs on the first 2 abdominal segments; tracheæ ending in a pair of discs on eighth abdominal segment (Fig. 21) : *Dixinæ*
 Thorax distinctly broader than abdomen, without distinct segmentation, paired prolegs lacking 2
2. Antennæ prehensile, with long and strong apical spines (Fig. 17) : *Chaoborinæ*
 Antennæ not prehensile (Fig. 8) : *Culicinæ*

Subfamily *Dixinæ*

This group is represented by the single genus *Dixa*.

KEY TO THE GENUS *DIXA**Adults*

1. Tips of hind tibiæ noticeably enlarged, deep black, sharply contrasting with the remainder of the member; wing veins with clouded margins; proboscis black, halteres yellowish, scutellum fuscous testaceous; terminal clasper segment tapering, mesal process of the basal segment simple, elongate:..... *clavata*
 Tips of hind tibiæ not so sharply differentiated 2
2. Petiole of R_{2+3} (measured on a straight line from its base to base of fork) less than $\frac{3}{8}$ as long as R_3 ; proboscis, scutellum, and knob of the halteres yellow; crossvein of wing very feebly clouded, r-m crossvein slightly distad of the base of R_{4+5} : *terna*
 Wing with other characters 3
3. Wing with one distinct spot 4
 Wing spot very indistinct or wanting 5
4. Petiole of R_{2+3} and R_3 subequal in length; proboscis and scutellum blackish: *centralis*
 Petiole shorter; proboscis and scutellum yellowish:
 *notata*
5. Dorsum of the thorax as well as the upper part of the pleura black; proboscis, halteres and scutellum dark : *fusca*
 Dorsum of the thorax yellowish with thoracic darker

- stripes which may be more or less confluent; palpi dark 6
6. First tarsal joint of fore leg about $\frac{2}{3}$ as long as the tibia: *cornuta*
 First tarsal joint of fore leg about $\frac{3}{4}$ as long as the tibia 7
7. Apical segment of the clasper of the male fully as broad beyond the middle as at the base; Sc ends about opposite the base of Rs; distance between the crossveins measured on the media usually not exceeding $\frac{1}{2}$ the length of the m-cu crossvein: *modesta*
 Apical segment of the clasper of the male tapering; Sc ends distinctly proximad of the base of Rs; distance between the crossveins about equal to the length of the m-cu crossvein: *similis*

Larvæ

Only two of the species given in the key above are known in the larval stage, *D. modesta* Joh. and *D. cornuta* (Joh.) which may be separated by using the key by Johannsen (1934).

Subfamily Chaoborinæ

KEY TO GENERA

Adults

1. Clypeus small and nearly bare; R_1 ending far from tip of R_2 : *Corethrella*
 Clypeus larger and very hairy; R_1 ending close to tip of R_2 2
2. First tarsal segment much shorter than second: *Mochlonyx*
 First tarsal segment longer than second 3
3. Clypeus as long as head; claws larger and toothed: *Eucorethra*
 Clypeus shorter than head; claws small and simple: *Chaoborus*

Larvæ

1. Eighth abdominal segment with an elongate single dorsal respiratory siphon or air tube 2

- Eighth abdominal segment without an elongate single dorsal air tube; with a flattened spiracular disc on the eighth segment or with air sacs in the thorax and the seventh abdominal segment.....3
2. Antennæ inserted close together, folding outwardly and fitting into grooves on the head (Fig. 20) :.....*Corethrella*
Antennæ inserted far apart, pendent in resting position (Fig 18) :.....*Mochlonyx*
3. Air sacs present in thorax and seventh abdominal segment (Fig. 17) :.....*Chaoborus*
Air sacs absent, a well-developed spiracular disc on eighth abdominal segment (Fig. 19) :.....*Eucorethra*

KEY TO THE GENUS CHAOBORUS

Adults

1. Wings spotted or clouded.....2
Wings without spots or clouds.....4
2. Width of hind marginal wing fringe nearly as great as distance between cubitus and hind margin.....3
Hind marginal wing fringe less than half the distance between cubitus and hind margin :.....*trivittatus*
3. Femora and tibiæ with numerous distinct spots :.....*punctipennis*
Femora and tibiæ without distinct spots except at bases and apices :.....*albatus*
4. Mesonotum with dark longitudinal bands :... *americanus*
Mesonotum with yellowish red longitudinal bands :.....*albipes*

*Larvæ**

1. Pre-labral leaf-like appendages very narrow and lanceolate :.....*punctipennis*
Pre-labral leaf-like appendages less than seven times as long as broad.....2
2. Mandibular fan with 25 or more rays :... *americanus*
Mandibular fan with not over 18 rays.....3
3. Mandibular fan with 16-18 rays :.....*trivittatus*
Mandibular fan with not more than 12 rays :... *albipes*

* Larva of *C. albatus* is unknown.

KEY TO THE GENUS MOCHLONYX

Adults

1. Wing vestiture entirely pale yellow 2
 Wing vestiture black and yellow: *cinctipes*
2. Scutellar setæ numerous, arranged in two or three irregular rows: *karnerensis*
 Scutellar setæ sparse, arranged in a single row:
 *fuliginosus*

Larvæ*

1. Clypeal and frontal spines barbed from base to a little beyond middle: *karnerensis*
 These spines with long barbs beyond middle: *cinctipes*
- * The larva of *M. fuliginosus* is unknown.

The following genera of the Chaoborinæ are represented by single species: *Corethrella brakeleyi* Coquillett and *Eucorethra underwoodi* Underwood.

Subfamily Culicina

KEY TO GENERA

Adults

1. Postnotum with a median tuft of setæ located near the posterior margin (Fig. 2): *Wyeomyia*
 Postnotum without a tuft of setæ 2
2. Wings with the second marginal cell not half as long as its petiole (Fig. 5): *Uranotænia*
 Wings with the second marginal cell more than half as long as its petiole 3
3. Scutellum rounded or crescent-shaped with an even fringe of marginal setæ (Fig. 3): *Anopheles*
 Scutellum distinctly trilobed (Fig. 4) with marginal setæ aggregated on the lobes 4
4. Spiracular bristles present (Fig. 2) 5
 Spiracular bristles absent 6
5. Post-spiracular bristles present (Fig. 2); abdomen of female with the eighth segment wholly retractile:
 *Psorophora*
 Post-spiracular bristles absent; cross veins of wings

tending to lie in line, or mesonotum with bare areas devoid of scales or both: *Theobaldia*

6. Pronotal bristles only two stout setæ (Fig. 2) ; proboscis with black and white scales so arranged as to form longitudinal striæ; mesonotum with six longitudinal lines of white scales: *Orthopodomyia*

Pronotal bristles more than two, generally a prominent row; proboscis without longitudinal striæ; mesonotum without six longitudinal lines of white scales.....7

7. Wings with scales distinctly large and broad; first joint of all tarsi with broad median rings; all of the other tarsal joints black with basal half white scaled:.....

..... *Mansonia*

Wings with scales normal; tarsi not as above.....8

8. Post-spiracular bristles present; female usually with the abdomen pointed and the cerci exerted or tarsi with white rings on both ends of joints: *Aedes*

Post-spiracular bristles absent; female with a blunt abdomen; tarsi without white rings involving both ends of joints: *Culex*

Larvæ

1. Eighth segment of abdomen provided with a distinct, elongate respiratory or air tube (Fig. 8) 2

Eighth segment of abdomen without a distinct, elongate respiratory or air tube (Fig. 9) : *Anopheles*

2. Air tube without a pecten (Fig. 12) 3

Air tube with a pecten (Fig. 8) 5

3. Air tube about twice as long as wide, the apical portion sharply attenuated and provided with saw-like teeth dorsally for penetrating into plant tissues (Fig. 12) ; larva found attached to the roots of certain aquatic plants: *Mansonia*

Air tube about three times as long as wide, tapering more or less uniformly to the apex.....4

4. Air tube with many short single hairs; larva found in the water of the pitcher plant: *Wyeomyia*

Air tube without scattered single hairs but with a large pair of hair tufts before the middle; abdomen

- with dorsal chitinous plates on the sixth, seventh and eighth segments: *Orthopodomyia*
5. Head elongate, elliptical; head hairs single, stout like heavy spines: *Uranotænia*
 Head nearly circular or transverse; head hairs not like heavy spines 6
6. Air tube with several pairs of ventral tufts: *Culex*
 Air tube with a single pair of ventral tufts or with a single pair of tufts and a median ventral row of 10 to 12 unpaired tufts or without any paired ventral tufts 7
7. Air tube with the paired hair tufts placed close to the base between the pecten rows: *Theobaldia*
 Air tube with the paired hair tufts placed near or beyond the middle 8
8. Anal segment ringed by the dorsal plate, with tufts of the ventral brush piercing the ring: *Psorophora*
 Anal segment not ringed by the dorsal plate, or if ringed, the tufts of the ventral brush posterior to the ring: *Aedes*

KEY TO THE GENUS *Aedes**Adults*

1. Proboscis of female ringed with white (Fig. 1) 2
 Proboscis of female not ringed with white 3
2. Abdomen with a pale longitudinal dorsal stripe (Fig. 1); wings with black and white scales: *sollicitans*
 Abdomen without a pale longitudinal dorsal stripe; wings with black scales: *tæniorhynchus*
3. Tarsi with white rings on at least some of the segments (Fig. 1) 4
 Tarsi without white rings 11
4. White tarsal rings involving both ends of segments 5
 White tarsal rings basal only 7
5. Wings scales markedly bicolored: *dorsalis*
 Wings scales uniformly dark, or nearly so 6
6. Mesonotum uniformly reddish brown, or nearly so: *canadensis*
 Mesonotum pale with a broad dark medium stripe; abdomen rather bluntly rounded: *atropalpus*

7. Tarsi with pale broad rings especially on hind legs; wings scales bicolored.....8
Tarsi with narrow rings; wing scales uniformly dark or nearly so.....10
8. Lower mesepimeral bristles absent: *excrucians*
Lower mesepimeral bristles present (Fig. 2).....9
9. With three to five lower mesepimeral bristles; mesonotum bronzy-brown on the disc, the scales on the antescutellar space, lateral margins and a sub-dorsal line each side of the disc whitish:..... *stimulans*
With two lower mesepimeral bristles; mesonotum with a broad median stripe of yellowish brown scales, the anterior edge, the sides of the disc and antescutellar space with yellowish white to white scales:..... *fitchii*
10. Last two abdominal segments nearly entirely white scaled, venter entirely yellowish white: *cantator*
Last two abdominal segments with apical and basal bands; venter with each segment with a median black spot or stripe which may be joined to lateral black spots forming a Y: *vexans*
11. Lower mesepimeral bristles absent..... 12
Lower mesepimeral bristles present..... 17
12. Mesonotum with silvery scales..... 13
Mesonotum without silvery scales..... 15
13. Mesonotum silvery on the sides with a dark brown median stripe which widens behind the middle and which is divided by the antescutellar space, the antescutellar space is margined by silvery scales: *triseriatus*
Mesonotum with a medium silvery stripe reaching scutellum or entirely silvered..... 14
14. Mesonotum with a broad well-defined median silvery stripe: *atlanticus*
Mesonotum with a narrower poorly defined or diffuse median stripe; mesonotum of male entirely silvery; a very small blackish species: *dupreei*
15. Abdomen with a continuous lateral white line; mesonotum uniformly colored with golden-brown scales, paler about the antescutellar space: *cinereus*
Abdomen without a continuous lateral white line; me-

- sonotum with a median dark band 16
16. Mesonotum with two yellow or yellowish-white stripes separated by a narrow, dark brown median band; sides dark brown to black: *trivittatus*
 Mesonotum with the golden brown median stripe slightly constricted at the middle; with two short sublateral stripes posteriorly: *hirsuteron*
 Mesonotum with the median band widening posteriorly; apical margins of abdominal segments with fine long brownish hairs: *aurifer*
17. With one to three small mesepimeral bristles; mesonotum with brownish-yellow scales uniformly distributed: *intrudens*
 With three or more stout mesepimeral bristles; mesonotum with a median stripe or paired brown median lines 18
18. Mesonotum with paired brown median lines 19
 Mesonotum with a median brown stripe 20
19. Mesonotum yellow or bronzy with a pair of black median lines, often joined into a median stripe; legs deep black: *diantæus*
 Mesonotum with paired median lines separated by a broad golden brown line: *impiger*
 Mesonotum with paired median lines separated by a narrow yellow line; sides grayish: *communis*
20. Mesonotum with the median band laterally expanded near the middle: *trichurus*
 Mesonotum with the median band only slightly darker than the lateral margins: *punctor**
 *implacabilis**

*There are no satisfactory characters with which to separate these species. In *A. punctor* the median band of the mesonotum may in some cases have a middle line of slightly paler scales. The last abdominal segment of *A. implacabilis* is usually pale scaled whereas in *punctor* it has a V-shaped dark area.

Larvæ

1. Air tube with tuft within pecten 2
 Air tube with tuft beyond pecten 3

2. Air tube with several dorsal hair tufts, anal gills normal: *trichurus*
Air tube without several dorsal hair tufts, anal gills large and inflated: *atropalpus*
3. Pecten with detached teeth outwardly (Fig. 15) 4
Pecten without detached teeth outwardly (Fig. 16) 9
4. Antennæ enlarged basally: *aurifer*
Antennæ not enlarged basally 5
5. Antennæ as long as head: *diantæus*
Antennæ not as long as head 6
6. Both pairs of head hairs (Fig. 8) double: *excrucians*
Both pairs of head hairs not double 7
7. Lateral abdominal hairs (Fig. 8) single beyond second segment 8
Lateral abdominal hairs not single beyond second segment: *vexans*
8. Air tube $2\frac{1}{2}$ to 3 times as long as wide, tuft on air tube large: *intrudens*
Air tube $3\frac{1}{2}$ to 4 times as long as wide, tuft on air tube small, located on outer third of tube: *cinereus*
9. Comb scales in a single or in an irregular single row 10
Comb scales in a triangle 13
10. Anal segment ringed by plate 11
Anal segment not ringed by plate: *triseriatus*
11. Air tube five times as long as wide: *dupreei*
Air tube 2 to $3\frac{1}{2}$ times as long as wide 12
12. Dorsal brush of anal segment consisting of two pairs of long hairs: *implacabilis*
Dorsal brush of anal segment consisting of a pair of long hairs and a pair of dorsal tufts: *atlanticus*
13. Anal segment ringed by plate 14
Anal segment not ringed by plate 17
14. Upper and lower head hairs double: *punctor*
Upper and lower head hairs single 15
15. Anal gills at least as long as anal segment: *trivittatus*
Anal gills shorter than anal segment 16
16. Lateral abdominal hairs double on segments two to five; scale of comb with a stout apical spine: *solicitans*

- Lateral abdominal hairs triple on segments three to five;
scale of comb with a fringe of spines of approximately
equal length: *tæniorhynchus*
17. Air tube at least four times as long as wide: *fitchii*
Air tube three times or less as long as wide 18
18. Head hairs single 19
Head hairs double or multiple 21
19. Anal gills at least as long as anal segment 20
Anal gills much shorter than anal segment: *dorsalis*
20. Scale of comb with broad apex bearing four to seven
stout spines: *communis*
Scale of comb with single stout spine: *impiger*
21. Both pairs of dorsal head hairs multiple 22
Both pairs of dorsal head hairs not multiple 23
22. Anal gills budlike; found in salt water: *cantator*
Anal gills well developed: *canadensis*
23. Lower head hairs double, upper triple: *hirsuteron*
Lower head hairs single, upper double: *stimulans*

KEY TO THE GENUS THEOBALDIA

Adults

1. Tarsi with poorly defined yellowish white rings at both
ends of some of the joints: *morsitans*
Tarsi without rings on any of the joints 2
2. Scales of the wings mixed, black or brown and white
especially along the costal margin; proboscis with
intermixed black and white scales: *inornata*
Scales of the wings all brown or black 3
3. Mesonotum brown marked with yellowish lines or spots;
wings with some of the scales slightly aggregated
along the third vein; a large species: *impatiens*
Mesonotum entirely reddish brown; wing scales normal;
each abdominal segment with an apical row of coarse
yellow hairs; a small species (4 mm.): *melanura*

Larvæ

1. Pecten produced into long hairs on outer half (Fig. 13) 2
Pecten not produced into long hairs on outer half 3

- | | |
|---|-----------------|
| 1. Palpus with white markings | 2 |
| Palpus without white markings | 3 |
| 2. Apical segment of palpus entirely white scaled; anal vein with three dark spots separated by white (two spots in the male) : | <i>crucians</i> |

- Apical segment of the palpus white-tipped; anal vein entirely dark without spots: *walkeri*
3. Costal margin of wing with two white or yellowish-white spots, a large one beyond the middle and a small one at the apical end: *punctipennis*
 Costal margin of wing without white or yellowish-white spots 4
4. Fringe at apex of wing with a distinct light yellow to coppery spot: *maculipennis*
 Fringe at apex of wing without a distinct light yellow to coppery spot 5
5. Wing with dark scales uniformly distributed: .. *barberi*
 Wing with the dark scales definitely aggregated to form dark spots at the base of the radical sector, at cross-veins r-m and m-cu, at fork of R_2 and R_3 and at fork of M_{1+2} and M_{3+4} : *quadrимaculatus*

Larvæ

1. Abdomen with plumose lateral hairs (Fig. 9) on first six segments; head hairs simple: *barberi*
 Abdomen with plumose lateral hairs on first three segments; head hairs plumose 2
2. Abdominal segments 4 and 5 with two conspicuous tufted hairs (Fig. 11) (hair 0 and the antepalmate or hair 2) anterior to the palmate tuft, these hairs usually approximately equal in size and with four to nine branches; fresh water form: *crucians*
 Abdominal segments 4 and 5 with but one conspicuous hair (antepalmate or hair 2) anterior to the palmate tuft, this hair may be single or with two or three branches 3
3. Abdomen with the palmate tufts on segments 3 to 7 inclusive, of similar form but those on segments 3 and 7 distinctly smaller than the others; posterior clypeal hairs (Fig. 10) long and usually single; tubercles of inner anterior clypeal hairs (Fig. 10) wide or close; brackish water form: *crucians*
 Abdomen with the palmate tufts on segment 3 approximately equal in size to those on the succeeding segments 4

4. Tubercles of inner anterior clypeal hairs separated by at least the width of one of these tubercles; antepalpmate hairs on segments 4 and 5 usually single; palpmate tufts on segment 2 usually well developed: *quadrimaculatus*
 Tubercles of inner anterior clypeal hairs so close together that another tubercle of similar size could not be placed between them 5
5. Inner anterior clypeal hairs not minutely feathered toward tip; antepalpmate hairs of abdominal segments 4 and 5 usually double or multiple 6
 Inner anterior clypeal hairs minutely feathered toward tip; antepalpmate hairs of abdominal segments 4 and 5 usually single: *walkeri*
6. Antepalpmate hairs of abdominal segments 4 and 5 usually with 2 branches, rarely 1 or 3; posterior clypeal hairs usually with 2 branches from near base; inner anterior clypeal hairs single, unbranched: *punctipennis*
 Antepalpmate hairs of abdominal segments 4 and 5 usually with 3 branches, rarely with 2 or 4; posterior clypeal hairs usually long with apical branching; inner anterior clypeal hairs unbranched or with 2 or 3 branches beyond middle: *maculipennis*

KEY TO THE GENUS CULEX

Adults

1. Abdominal segments with transverse apical white bands: *apicalis*
 Abdominal segments with basal white bands or none: 2
2. Abdominal segments with basal white bands 3
 Abdominal segments without basal white bands: *salinarius*
3. Basal white band of the second abdominal segment triangularly produced medianly: *pipiens*
 Basal white band of the second abdominal segment transverse: *territans*

Larvæ

1. Antenna with the tuft at or before the middle *territans*
 Antenna with the tuft beyond the middle 2

2. Both upper and lower head hairs multiple.....3
 Both upper and lower head hairs not multiple, usually single but with all variations between the complete single and complete double condition, rarely with one or two head hairs triple:*apicalis*
3. Air tube long and slender, about seven times as long as broad, slightly expanded before the apex; subdorsal hairs on segments three to six multiple: ... *salinarius*
 Air tube not over five times as long as wide tapering uniformly toward the apex; subdorsal hairs double on segments three to six:*pipiens*

The following genera of Culicinæ are represented by single species; *Mansonia perturbans* (Walker), *Orthopodomyia signifera* (Coquillett), *Uranotænia sapphirina* (Osten Sacken), *Wyeomyia smithii* (Coquillett).

SUMMARY OF SPECIES OF CULICIDAE REPORTED FROM MASSACHUSETTS

The following species of mosquitoes were reported by Johnson (1925):

Subfamily Dixinæ

- Dixa centralis* Loew
D. clavata Loew
D. cornuta Johannsen
D. modesta Johannsen
D. notata Loew

Subfamily Chaoborinæ

- Mochlonynx cinctipes* Coquillett as *Corethra cinctipes* Coquillett
M. karnerensis Felt as *Corethra culiciformis* (DeGeer)
M. fuliginosus Felt as *Corethra fuliginosus* Felt.
Chaoborus albipes (Johannsen)
C. americanus Johannsen as *C. crystallina* DeGeer
C. albatrus Johnson
C. punctipennis Say
C. trivittatus Loew

Subfamily Culicinæ

- Wyeomyia smithii* (Coquillett)

Erratum

page 129, first line, above *Culex apicalis* insert:

Culex apicalis Adams as *C. testaceus* Van der Wulp

C. territans Walker

C. salinarius Coquillett

Theobaldia melanura (Coquillett) as *Culex melanurus* (Coquillett)

T. morsitans (Theobald) as *Culiseta dyari* (Coquillett)

T. inornata (Williston) as *Culiseta inornatus* (Williston)

Mansonia perturbans (Walker) as *Taeniorhynchus perturbans* (Walker)

Psorophora ciliata (Fabricius)

P. posticata (Wiedemann) as *P. sayi* Dyar and Knab

Aedes trivittatus (Coquillett)

A. aurifer (Coquillett)

A. punctor (Kirby)

A. intrudens Dyar

A. hirsuteron (Theobald)

A. communis (DeGeer) as *A. lazarensis* (Felt and Young)

A. dorsalis (Meigen)

A. canadensis (Theobald)

A. stimulans (Walker)

A. cantator (Coquillett)

A. fitchii (Felt and Young)

A. trichurus (Dyar) as *A. cineroborealis* Felt and Young

A. atropalpus (Coquillett)

A. excrucians (Walker)

A. taeniorhynchus (Wiedemann)

A. sollicitans (Walker)

A. triseriatus (Say)

A. vexans (Meigen)

A. cinereus (Meigen)

A. impiger (Walker)

Uranotænia sapphirina (Osten Sacken)

Anopheles punctipennis (Say)

A. quadrimaculatus (Say)

A. maculipennis (Meigen)

A. walkeri (Theobald)

In 1930 one additional Culicine was reported by Tulloch:

Aedes implacabilis (Walker) or *Aedes abserratus* (Felt and Young)

Several species new to Massachusetts have been recovered during the present survey. They are as follows:

Subfamily Chaoborinæ

Eucorethra underwoodi Underwood—Yarmouth, July 27, 1939, Armstrong

Corethrella brakeleyi Coquillett—Taunton, July 20, 1939, Collector M. W. Chambers

Subfamily Culicinæ

Psorophora columbiæ Dyar and Knab—Northampton, July 18, 1939, Collector W. J. Neunier

Orthopodomyia signifera (Coquillett)—Sudbury, August 28, 1939, Collector W. J. Normandin

Anopheles crucians Wiedemann—Orleans, August 29, 1939, Collector J. L. Drew

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EXPLANATION OF PLATES

PLATE 4

1. Female mosquito (after John B. Smith).

PLATE 5

2. Side view of thorax showing bristle areas.
3. Dorsal view of crescent-shaped scutellum.
4. Dorsal view of trilobed scutellum.
5. Generalized wing of a mosquito.
6. Tarsus with toothed claws.
7. Tarsus with simple claws.

PLATE 6

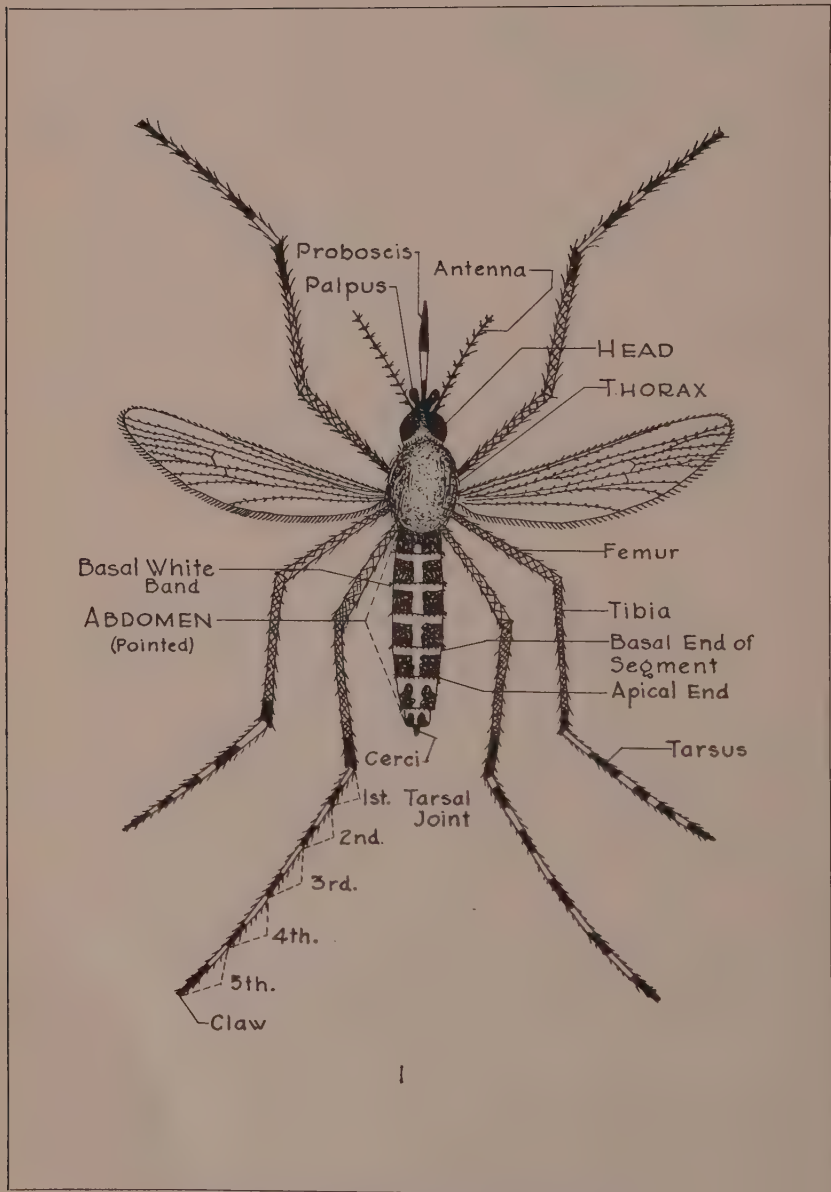
8. Larva of *Aedes* (after Marshall).
9. Larva of *Anopheles* (after Marshall).

PLATE 7

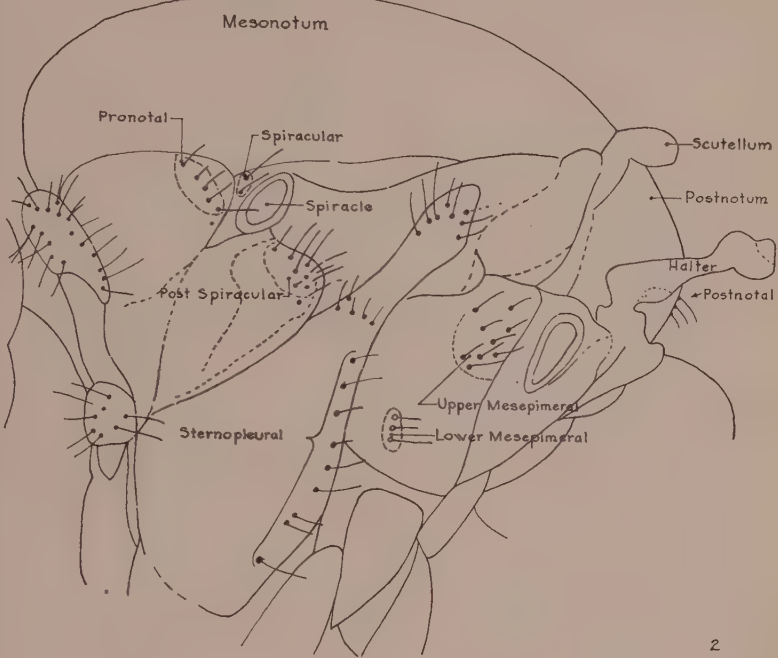
10. Head of *Anopheles* larva (after Marshall).
11. Dorsal view of segments 4 and 5 of *Anopheles* larva.
12. Air tube sharply attenuated without a pecten.
13. Air tube with some of the pecten teeth produced into long hairs.
14. Air tube fusiform with small tuft (after Dyar).
15. Air tube with pecten teeth detached outwardly.
16. Air tube with pecten teeth not detached outwardly.

PLATE 8

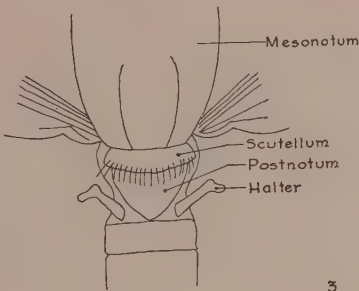
17. Larva of *Chaoborus* (after Johannsen).
18. Larva of *Mochlonyx* (after Johannsen).
19. Larva of *Eucorethra* (after Johannsen).
20. Larva of *Corethrella* (after Johannsen).
21. Larva of *Dixa* (after Johannsen).



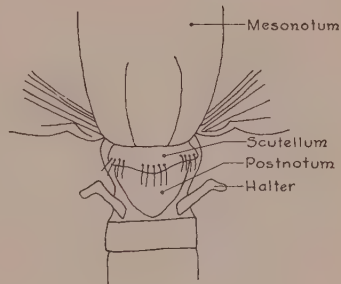
Tulloch — Mosquitoes of Massachusetts.



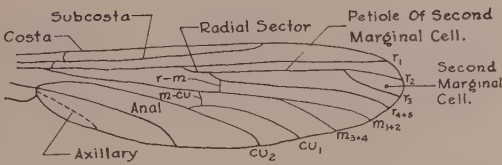
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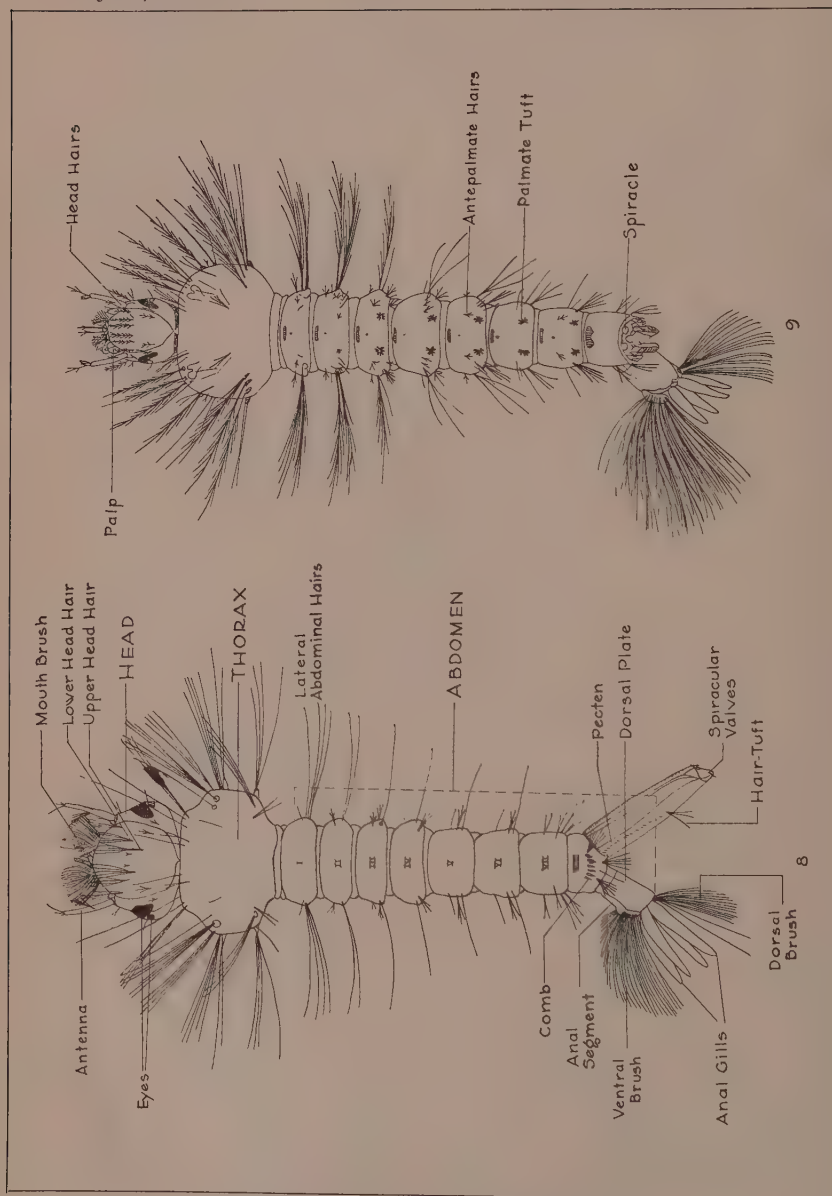
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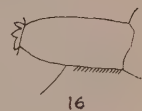
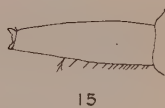
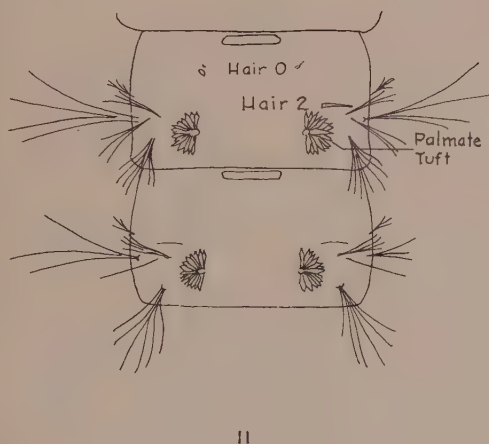
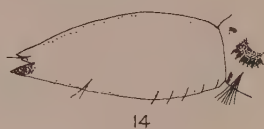
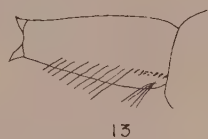
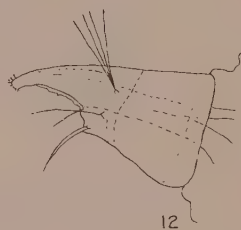
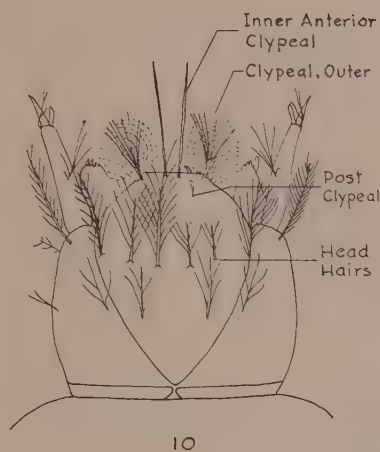
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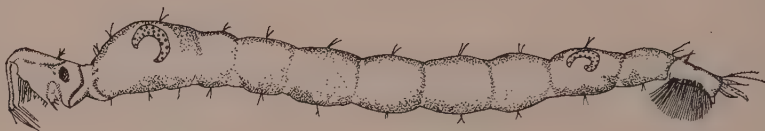
Psyche, 1939

VOL. 46, PLATE VI.



Tulloch — Mosquitoes of Massachusetts.





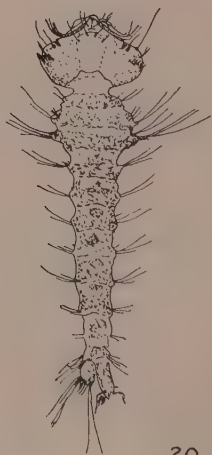
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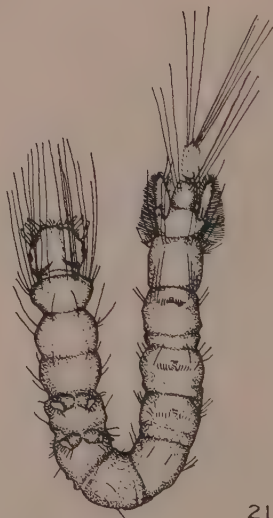
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21

A NEW SUBSPECIES OF *CREMATOGASTER*
MINUTISSIMA WITH REVISIONARY NOTES
CONCERNING THAT SPECIES.
(HYMENOPTERA: FORMICIDÆ)

BY WILLIAM S. CREIGHTON

College of the City of New York.

In 1895 Carlo Emery published the second half of his monograph dealing with North American ants. A considerable proportion of the material on which this work was based had come to Emery from Pergande who was, at that time, connected with the National Museum. As a general rule Pergande gave no names to the ants which he sent to his colleague probably because, in most cases, he was not sure as to what was new. In the instance which I wish to discuss here, however, Pergande had not only recognized the form as new but had selected the name which it now bears. There seems to be no other interpretation which can be placed upon Emery's treatment of *Crematogaster victima* subsp. *missouriensis*. Emery attributed this form to Pergande, stating that the latter had used the name *in litteris*. There is no method whereby one can determine whether Pergande was actually preparing to publish a description of *missouriensis* and it makes very little difference if he was. Emery accompanied his citation of the form with a brief characterization permitting its recognition. This, of course, is the original description of *missouriensis*, which is to be attributed to Emery and not Pergande. I do not doubt that many would regard this as a flagrant case of name-grabbing but it is by no means certain that such was the case. It is difficult to believe that Emery supposed that he could give *missouriensis* to Pergande by merely citing him as author. It seems more probable that Emery was under the impression that Pergande would publish the description of the new form before the appearance of his (Emery's) monograph and that he inad-

vertently let slip into print a manuscript notation which was to have been subsequently altered. It is easier to be tolerant of this mistake than it is to agree with Emery's treatment of the taxonomic status of *missouriensis*. I can see no reason why he should have assigned it to *victima* instead of to Mayr's *minutissima*. In 1870 Mayr had published a key to the New World species of *Crematogaster* in which he clearly distinguished between the characteristics of Smith's *victima* and his own *minutissima*. Emery must surely have employed Mayr's key and just as surely he should have been aware that *missouriensis* is more closely related to *minutissima* than to *victima*. The distinct areas of cephalic punctures which are present in *victima* are absent in the other two forms. In recent years the recognition of a number of additional subspecies has considerably expanded the specific limits of *victima*. Even so the above contention can be defended. Still more peculiar is Emery's disregard for zoögeographical considerations. When he assigned *missouriensis* to *victima* the latter species was known only from Brazil. It would certainly have seemed more logical to consider the possibility of relationship with a species which had been found in the Gulf Coast region. As far as I can determine no one has ever questioned Emery's judgment in the matter. Despite this I believe that *missouriensis* should be regarded as a northern race of *minutissima*. In addition there is a western race which is described below.

***Crematogaster* (*Orthocrema*) *minutissima thoracica*
subsp. nov.**

The subspecies *thoracica* differs from the typical form and the subspecies *missouriensis* in its distinctly more shining thoracic dorsum. In both the other two forms the dorsum of the promesonotum bears, in addition to longitudinal rugæ, a number of fine and fairly close-set punctures. These punctures, while not dense enough to produce an opaque appearance, dull the surface to a considerable extent. They are not present in the subspecies *thoracica*. In addition *thoracica* usually lacks longitudinal rugæ on the pronotum and, when they are present, they appear to form a wavy border at the extreme edge of the pronotum. The longi-

tudinal rugæ in the typical *minutissima* are well developed and at least two of them lie well in towards the center of the pronotum. In *missouriensis* the rugæ are variable in position but when they occur at the edge of the thorax, as frequently happens, they are more prominent than in *thoracica*. The shape of the petiole seen from above is usually quite characteristic in *thoracica*. The sides gently diverge behind so that the petiole is widest at the rear. The difference is not great but the wedge-like appearance is rather different from that of the other two subspecies, where the petiole is more quadrate with the sides subparallel and widest, if there is much difference in width, at the middle. The epinotal spines of *thoracica* are short like those of the typical form. In other respects *thoracica* is very similar to the typical *minutissima*.

Described from a series of workers taken by W. M. Mann in Miller Canyon, Huachuca Mountains, Arizona (elevation 6000 ft.). In addition to this type series I have seen other specimens also secured by Dr. Mann, in Ramsey Canyon (elevation 5800 ft.) in the Huachucas.

Holotype (worker) and a series of paratypes in the collection of the Museum of Comparative Zoölogy. Additional paratypes in the collection of the American Museum of Natural History and the collection of the writer.

The three subspecies of *minutissima* and our single remaining species in the subgenus *Orthocrema*, Cr. (*O.*) *arizonensis*, may be separated as follows:

1. Tip of the antennal scape in repose notably surpassing the occipital border; color yellow; the gaster clothed with abundant long hairs.....2

Tip of the antennal scape in repose failing to reach the occipital border; color piceous brown; the erect hairs of the gaster short and sparse:.....*arizonensis*

2. Dorsum of the promesonotum very smooth and shining; rugæ, if present, feeble and confined to the edge of the pronotum:.....*minutissima thoracica*

Dorsum of the promesonotum finely punctate in addition to the longitudinal rugæ, the surface feebly shining; rugæ well-developed and often placed towards the center of the thorax.....3

3. Epinotal spines about one-half as long as the distance which separates their bases and rather strongly directed upward; pronotum with the rugæ usually lateral in position: ----- *minutissima missouriensis*

Epinotal spines less than half as long as the distance which separates their bases and directed more backward than upward; pronotum with two prominent rugæ near the middle: - ---- *minutissima minutissima*

THREE NEW NEOTROPICAL COPROPHAGOUS
COLEOPTERA

BY RENAUD PAULIAN

Laboratoire d'Entomologie du Museum, Paris

The three new species described herein were sent me for study, together with a long series of unnamed coprophagous Coleoptera, mostly from the Neotropical region, by the Museum of Comparative Zoölogy of Harvard University. I am glad of this opportunity to thank Dr. P. J. Darlington, Jr., for the most interesting material he sent me and for his generosity in allowing me to keep paratypes of the new species.

Besides the new species, the material sent to me contained a long series of species of *Canthidium*. For the most part they were probably new, at least the species were neither in the Paris Museum, the British Museum, nor in my own collection. But it should be necessary, before describing new species of this genus, and of the closely allied *Choeridium*, to make a general revision of the species, as Harold's monographs are old and rather inadequate.

I take this opportunity to indicate that *Uroxys productus* Arrow, described from an old specimen without locality label, has been collected by Dufau (in coll. Fleutiaux) under stones at Trois Rivières, Guadeloupe Is., West Indies. It appears to be rare and found only in unique specimens.

***Canthon darlingtoni* n. sp. (fig. 1, 2, 7)**

Type: One specimen from Colombia: Santa Marta (P. J. Darlington). Museum of Comparative Zoölogy, no. 23,693.

Paratypes: A small series of specimens from the same locality in my collection and the Museum of Comparative Zoölogy.

Length: 4.75-5.5 mm., breadth: 3-3.5 mm.

Body convex, orbicular, very broad, shining but minutely shagreened above. Head brown-red; thorax pale testaceous

with a large median anterior dark red patch; this patch touches the anterior margin, which is slightly darkened, as are also the lateral margins and the small lateral foveæ; middle of base with a vaguely rectangular dark patch. Elytra pale testaceous, with a dark transverse patch along the base; this patch broader at the sides, the sutural interstriae darkened, a broad transverse patch about the middle, and on each elytron a small dark apical patch. Antennal club piceous, trophi yellow; legs red, with the femora largely testaceous in the middle, tarsi only slightly paler than the tibiae. Under-side red, with a small testaceous patch at the sides of the abdominal segments, this patch much larger on the last segment; pygidium reddish at the base, yellow at the apex.

Head rather broad, part of the eyes visible from above small and narrow; sides of the clypeus slightly raised, the anterior part impressed between the two anterior teeth; vertex with a slight median impression; anterior clypeal teeth curving upwards, rather long, parallel, rounded at apex; sides of the clypeus only very feebly sinuate between these teeth and the clypeogenal suture, which is very slightly marked; genal sutures feeble; genæ rounded, their greatest breadth at the middle. Head without any puncturation.

Thorax transverse, anterior angles acute, sides straight between those angles and the median angles, which are rounded and protrude very slightly behind. Posterior half of the sides gently rounded to the hind angles which are very slightly protruding behind, the sides of the base being feebly emarginated just inside these angles. Lateral margin a little more marked at the anterior angles; anterior margin complete; base gently rounded, with only a very slight angular protuberance in the middle; no scutellar impression. Puncturation very feeble and sparse, slightly stronger behind.

Elytral margins nearly straight, strongly curved behind; elytra convex, depressed along their apical margin; interstriae flat, regular, only very sparsely and very feebly punctured; striae distinct, not deep, distinctly punctured; scutellar impression very deep; elytral striae ending anteriorly in small, basal, longitudinal foveæ; external epipleural margin very sharp, epipleura broad.

Pygidium nearly smooth, very short and broad, not margined at the base. No prosternal carina; mesosternum very

short; metasternum with a broad, arcuate fovea, smooth. Anterior tibia broad, with three very sharp and long marginal teeth; median and posterior tibiae slightly arcuate and strongly carinate. Tarsi long, equal to $\frac{3}{4}$ of the tibial length, compressed, metatarsus much shorter than the second joint. Hind femora slightly clavate, not margined.

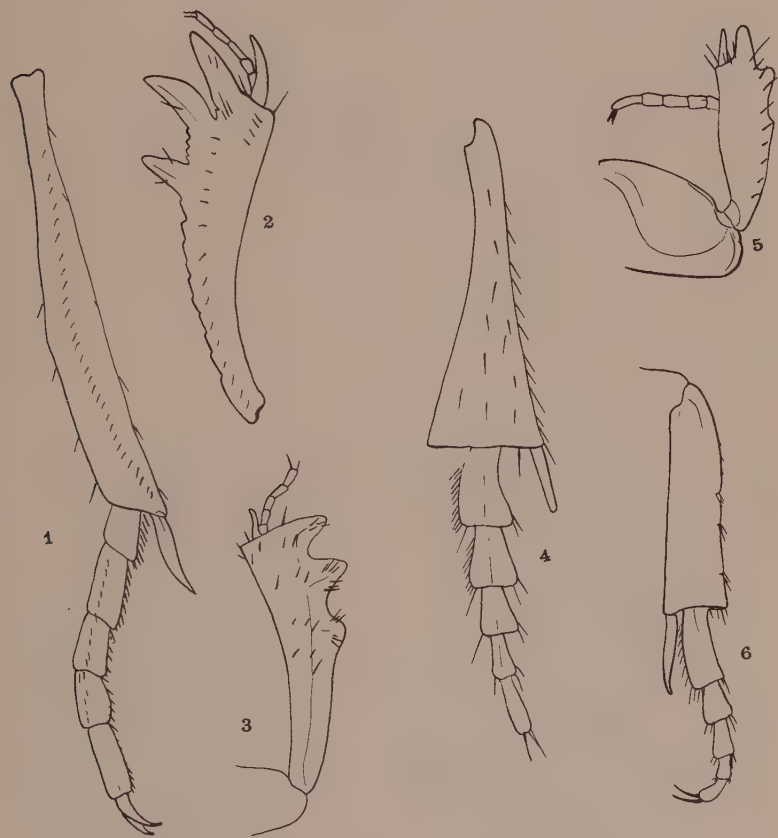


Fig. 1. *Canthon darlingtoni* n. sp., posterior leg.

Fig. 2. *id.*, anterior leg.

Fig. 3. *Uroxys pygmaeus*, anterior leg.

Fig. 4. *Bdelyrus bowditchi* n. sp., posterior leg.

Fig. 5. *Onthocharis panamensis* n. sp., anterior leg.

Fig. 6. *id.*, posterior leg.

This very pretty little species belongs to the group *cyanocephalus* Har. but it is quite peculiar by its colour pattern and its broad form.

Bdelyrus bowditchi n. sp. (fig. 3, 4)

Type: From British Honduras: M-tee district, F. C. Bowditch Collection. Museum of Comparative Zoölogy no. 23,694.

Paratype: One specimen from the same locality in my collection.

Length: 5 mm., breadth: 3.2 mm.

Body rather convex, with curved sides; very dark brown, not shining, all the upper surface finely but distinctly shagreened.

Head very broad and short; part of the eyes visible from above very large, nearly round; clypeus impressed in front, with four teeth, the median teeth very close together, long, broad, upturned and rounded at tip; lateral teeth very short and blunt; the clypeogenal suture marked by a deep, rounded notch at the sides of the head; upper surface rather closely covered with middle-sized punctures.

Thorax very transverse, the anterior angles greatly protruding, rather blunt; the sides regularly curved, the greatest breadth being in the middle. Posterior angles straight; base gently curved and very feebly margined in the middle. Thorax with a rather deep longitudinal sulcus on each side of the disc. Puncturation of the thorax sparse and rather feeble, bearing (as do the elytra) short yellow setæ, erect and feebly clavate at tip.

Elytra short and broad, with rounded sides; the lateral margin is made by the eighth elytral interstria, which is strongly carinate up to the apex of the elytra. Humeral angle acute and protruding forwards; interstriae slightly convex, with two irregular rows of setigerous punctures. Striae feeble, cateniform, straight. Epipleural carinae distinct.

Pygidium horizontal, short and small, with a strong annular groove. Mesosternum rather long. Prosternum strongly excavated under the front angles. Anterior tibiae truncate at apex, short and broad; posterior tibiae greatly enlarged at the tip. Tarsal joints triangular.

This new species appears at first sight as nearer to *Canthochilum* Chap. than to *Bdelyrus* Har. but the structure of the elytra ranges it decidedly in this last genus. *B. bowditchi* n. sp. is quite different from *B. seminudus* Bates (from Costa Rica and Ecuador) by the puncturation, the shagreened upper surface and the quadridentate clypeus. *B. lagopus* Har. from Brazil, the genotype, is unknown to me but nothing in its description differentiates it from *B. seminudus*, which, by the way, Bates placed in *Aphengium*.

***Onthocharis panamensis* n. sp. (fig. 5, 6, 8)**

Type: From Panama Canal Zone: Barro Colorado Island, K. W. Cooper. Museum of Comparative Zoölogy no. 23,695.

Paratype: A specimen from the same locality in my collection.

Length: 3.5 mm., breadth: 1.5 mm.

Body parallel, elongate, very shining, very convex, metallic green.

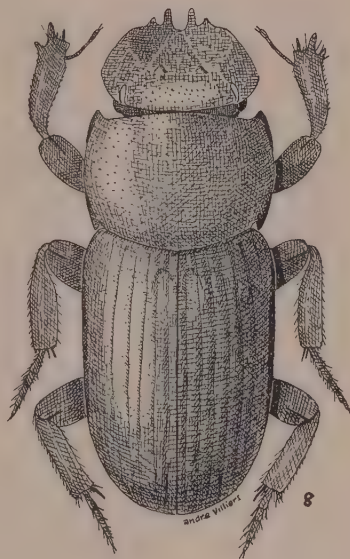


Fig. 7. *Canthon darlingtoni* n. sp.

Fig. 8. *Onthocharis panamensis* n. sp.

Head very broad, clypeus depressed in front, sex-dentate, the lateral teeth very short, broad and rounded; the median teeth long, slender, rounded at the apex. Part of the eyes visible from above very narrow. Vertex with two small, rounded tubercles. All the head covered with a sparse and rather strong puncturation.

Thorax very convex, parallel-sided in the first four-fifths, slightly sinuate behind; posterior angles strongly protruding behind; base strongly emarginate inside the posterior angles, a strong oblique depression in front of this emargination; base gently and regularly rounded; disc of thorax with a short median longitudinal sulcus on the posterior half, this sulcus not touching the base; front angles acute; puncturation rather strong and sparse.

Elytra parallel, with a feeble scutellar impression, interstriae slightly convex, very feebly and sparsely punctured; striae rather strong, not closely punctured. Pygidium very convex and shining, rather long, strongly margined, the margin slightly angular in the middle, sparsely and finely punctured.

Front tibiae broad, smooth, tridentate externally, the apical tooth in line with the lateral margin of the tibiae. Posterior and median tibiae compressed, parallel, broad. Posterior tarsi with the first joint nearly as long as the two following taken together, cylindrical. Abdomen nearly smooth. Prosternum with a long, transverse, slightly oblique carina; the front angles slightly excavated.

This new and very small species is quite distinct from the known species of the genus (and I have had the opportunity of studying in London the types of Westwood and Waterhouse) by the length of the tarsal joints and their cylindrical form. A general revision of the genus is much needed as many unidentified, and probably new, species are to be found in many collections and museums.

METAMORPHOSES OF CUBAN HESPERIINÆ

BY V. G. DETHIER

Biological Laboratories, Harvard University

INTRODUCTION

As is generally the case when the life histories of skippers are studied, members of the subfamily Pyrginæ receive most attention while the Hesperiinæ are almost totally neglected. This situation is difficult to understand for though larvæ of the Pyrginæ are admittedly more spectacular and more frequently encountered in the field, a satisfactory treatment of their life histories is rendered difficult by several factors not the least of which is the fact that gravid females do not readily oviposit in captivity. Again, in many instances the food plant is unknown. On the other hand, Hesperiinæ oviposit on the least provocation, and the larvæ can be reared practically upon any grass. It is all the more surprising that the metamorphoses of Cuban Hesperiinæ have suffered neglect since all species can undoubtedly feed on sugar cane. Those species treated in this paper readily did so and the Hesperiinæ include not a few potential sugar cane pests.

Of the twenty-two species listed in this subfamily by Bates (1935) the life histories of but half are now known. Species which also occur in the United States have been studied by workers there. Gundlach (1881) recorded two additional species, and six species are treated below.

This work was made possible by my receiving a Harvard University Fellowship to study at the Atkins Institution of the Arnold Arboretum at Soledad, Cuba. The incompleteness of some of the life histories is due in part to the limited time available for study in Cuba. Color descriptions are based on a comparison with Ridgway's (1920) color charts.

It is a pleasure to acknowledge the generosity of Professor Thomas Barbour and the cheerful assistance of Mr. Frank Walsingham.

Polites baracoa (Lucas)*Egg.*

Height .5 mm. Greatest diameter .7 mm. Yellow when laid, later becomes flesh color due to the appearance of blood red coloring in the fine raised reticulation present over the surface of the egg.

First Instar.

Head height .4 mm.; head width .37 mm. Head deep piceous. Shallowly punctate. Shield same color. Length of body 1.5 mm. Body yellow at emergence; after eating, tinged with grass green. Clothed with short distinctly clavate hairs. Anal segment with two pairs of long forwardly recurved hairs and a shorter pair of backwardly decurved hairs. Spiracles very faint fuscous. Legs fuscous.

Second Instar.

Head height .7 mm.; head width .6 mm. Head lighter piceous than before, with more numerous short colorless hairs. Head roughly punctate. In some specimens there are light areas in the regions of the epicranial and adfrontal sutures. Body length 2.4 to 4 mm. Body light green covered with many short colorless to brown hairs. Anal plate gray.

Third Instar.

Head height .9 mm.; head width .85 mm. Head roughly punctate. Slight evidence of light areas characteristic of later instars (cf. Fig. 10). Length of body 5.5 mm. Green dorsally, yellow laterally and ventrally. Covered with numerous short black hairs. Anterior two thirds of anal plate gray with a roughly spherical light area on either side of the median line. Posterior third of anal plate a much lighter gray.

Fourth Instar.

Head height 1.1 mm.; head width 1.1 mm. Head coarsely shagreened. Characteristic piceous design on a very light fuscous background (Fig. 10). Margin of foramen magnum piceous. Body length 6.5 to 8 mm. Mid-dorsal line dull green. Paradorsal lines mottled with light and dark green. Intersegmental areas brownish. Spiracles light cream. Short hairs covering body arising from small black warts. Dark

gray area of anal plate of greater extent. Light spots more elongate.

Fifth Instar.

Head height 1.4 mm.; head width 1.5 mm. Piceous design reduced in area. Ground color Old Gold except for a white band on either side of the epicranial suture and a white spot in the region of the ocelli. Rim of foramen magnum black. Body length 10 mm. Narrow irregular mid-dorsal line Argus Brown. Lateral line same but wider. Body Vinaceous-Buff, lighter on borders of lateral line and spotted with few irregular spots of Argus Brown. Stigmatal line a faint suggestion of darker background. Areas between dorsal line and lateral line more heavily spotted than elsewhere. Scattered colorless hairs over body. Spiracles cream. Black and white design on anal plate as in Fig. 4.

Eggs laid May 10 and 11 hatched May 17 seven days having elapsed. Moulting into the second instar took place on May 22 the first instar being of five days' duration. The second instar was of four to five days' duration moulting having occurred May 26. The third instar consumed five days with moults May 31. The fourth and fifth instars likewise were of five days' duration each.

Catia misera (Lucas)

Egg.

Height .75 mm. Greatest diameter .82 mm. Egg white, covered with a raised reticulation forming polygonal areas as is usual with the eggs of *Hesperiinae*.

First Instar.

Head height .5 mm.; head width .45 mm. Head black, shiny, very faintly punctate. Few very small whitish hairs. Body length 2 to 3.8 mm. Body light Vinaceous-Buff spotted evenly with Fawn Color spots, more distinct on the posterior segments. Becomes slightly grass green especially at the anterior end after eating. Few scattered hairs on body bulbous at tip. Two pairs of long forwardly recurved hairs on anal segment. Also a pair of shorter backwardly decurved hairs. Claws of first pair of legs slightly fuscous.

Second Instar.

Head height .72 mm.; head width .70 mm. Head shiny black with faintly raised reticulations also shiny. Thoracic legs fuscous. Length of body 4.5 to 5 mm. Body dull grass green thickly mottled with maroon and white. Dull greenish mid-dorsal line. Under side of body dull greenish. Bright orange spot on each segment, segments one and two excepted, at stigmatal line. Short hairs covering body. Those on anal plate longer.

Third Instar.

Head height .8 mm.; head width .78 mm. Head roughly shagreened. Characteristic black and white design of head with greater percentage of black than in following instars (cf. Fig. 13), that is, white bands not so broad. Body length 5 to 7 mm. Body mottled white and dark ferruginous on dull background. Orange spots same as above. Many short black hairs from black tubercles. Legs fuscous.

Fourth Instar.

Head height 1.2 mm.; head width 1.0 mm. Head design as in Fig. 13. Body length 7 to 10 mm. Not much change from previous instar, general effect darker.

The egg stage lasted from seven to ten days. Eggs laid May 6, 7, and 8 hatched May 16; those laid May 9 to 11 hatched May 18; those laid May 19 and 20 hatched May 26 and 29. The first instar was of five to six days' duration with moults occurring in the above three groups May 23, 23, and 31 respectively. The second instar was of four to eight days' duration. The third and fourth instars were of seven days' duration each.

Poanes radians* (Lucas)Egg.*

Height .5 mm.; greatest diameter .75 mm. Pearl white when laid. Later acquires a bright pink design which consists of an irregular circumpolar band and a slightly wider irregular equatorial band. The usual reticulation is present.

First Instar.

Head height .5 mm.; head width .52 mm. Head shiny black, faintly pitted. Body length 2 to 3.5 mm. Claws of

thoracic legs fuscous. Body light Baryta yellow; light green after eating. Two pairs of long forwardly recurved hairs of approximately equal length on anal segment.

Second Instar.

Head height .72 mm.; head width .7 mm. Head dull black, raised reticulations darker than ground work. Lighter in region of epicranial suture. Length of body 4.5 mm. Body yellow green covered with minute black hairs. Dorsal line slightly darker green. A conspicuous black stellate spot on each side of the median line of the anal plate.

Third Instar.

Head height .87 mm.; head width .8 mm. Characteristic brown to piceous head design on yellowish background (cf. Figs. 7 and 9) first appears in this instar. Areas bordering the epicranial and adfrontal sutures are white. Body length 5.5 to 9 mm. Body grass green with many short black hairs. Dull green mid-dorsal line. Spots on anal segment now usually four (Fig. 1).

Fourth Instar.

Head height 1.25 mm.; head width 1.10 mm. Head as in Figs. 7 and 9. Body length 9.5 mm. Similar to foregoing instar.

Eggs laid May 6 to 8 emerged May 13, five to seven days having elapsed. The first instar consumed six days moulting having occurred May 19 and 20. The second instar was of five to twelve days' duration with moulting May 31. The third and fourth instars required ten days each.

Lerodea tripuncta (Herrich-Schäffer)

Fourth Instar.

Head height 1.5 mm.; head width 1.35 mm. Head with a rough raised reticulation and the same characteristic fuscous design on whitish background as in the following instar. Body light green covered with short whitish to brownish hairs.

Fifth Instar.

Head height 1.9 mm.; head width 1.5 mm. Head as in

Fig. 5. Roughly shagreened and covered with many short white hairs. Body length 22 mm. Light green.

Chrysalis.

Length 18 mm. Narrow and generally cylindrical in shape. Anterior end acute. Cremaster long and pointed. Tongue case same length as chrysalis but free from base of wing pads to end. Surface of chrysalis smooth. General color light green. Free portion of tongue case with slight pinkish tinge. Cremaster transparent and colorless at its tip.

Prior to emergence of the adult the dark color of the wings becomes visible as does also the brilliant red of the eyes. The duration of the chrysalis stage is eight days.

Prenes nero sylvicola (Herrich-Schäffer)

Egg.

Height .5 mm. Greatest diameter .75 mm. The eggs range in color from bone white to flesh. The surface is adorned with a raised reticulation forming polygonal cells.

First Instar.

Head height .5 mm.; head width .6 mm. Head piceous, shiny, punctate, and with few whitish hairs. Body length 2 to 4 mm. Yellow on emergence, light green after eating. Covered with a few short brown clavate hairs. Anal plate with two pairs of very short (for this position) recurved hairs.

Second Instar.

Head height .75 mm.; head width .6 mm. First appearance of characteristic head pattern (cf. Fig. 11). Head with raised reticulation and short brownish to colorless hairs. Ground color light yellowish to greenish. Length of body 4.5 mm. Body clear grass green with a dark green mid-dorsal line bordered by a narrow white line. Also thin white para-dorsals. Body covered with minute black hairs.

Third Instar.

Head height .9 mm.; head width .9 mm. Dark areas of head pattern more extensive than in following instar (Fig. 11). Minute black hairs covering head. Length of body 6

to 13 mm. Design as in previous instar but more pronounced. Faint indication of a white substigmatal line.

Fourth Instar.

Head height 1.6 mm.; head width 1.5 mm. Head as in Fig. 6. Body length 15 mm. Similar to previous instar.

Eggs laid May 11 to 13 emerged May 15 and 16 three to five days having elapsed. The first instar consumed from four to eight days with moults May 19 and 23. The second instar required five days with moults May 28. The third instar was of four days' duration.

***Prenes nyctelius coscinia* (Herrich-Schäffer)**

Second Instar.

Head height 1.6 mm.; head width 1.5 mm. Head with raised reticulations and the characteristic design seen in all the following instars (cf. Fig. 8). Body green covered with minute brown hairs.

Third Instar.

Head height 2.1 mm.; head width 2.0 mm. Roughly punctate, otherwise similar to previous instar. Body length 12 mm. Body covered with many short black hairs. First four segments Sorrento Green. Remainder of body Opaline Green. Stigmatal line Opaline Green.

Fourth Instar.

Head height 2.6 mm.; head width 2.5 mm. Similar to previous instar. Body length 18 to 20 mm. Same as above.

Fifth Instar.

Head height 3.2 mm.; head width 3.0 mm. Head roughly punctate. Design as in Fig. 8. Dark areas fuscous; light areas Reed Yellow. Body length 25 to 28 mm. Body Water Green.

Chrysalis.

Length 21 mm. Covered with short brown hairs except on head and dorsal areas where the hairs are considerably longer, those on head being the longest. Tongue case reaches only to sixth abdominal segment. It is free only at the last

segment. Cremaster short and blunt. General ground color dead grass yellow. Eyes, mouthparts, cremaster, and tip of tongue case light brown. Two brown spots on pronotum.

When about to pupate the mature larva becomes dead grass yellow and spins a loose cocoon in the grass. Larvæ which pupated May 18 emerged May 27 nine days having elapsed.

CLASSIFICATION

Although the extent of our knowledge of larval Hesperiiinæ in Cuba does not yet permit of a workable key to the different species, it already holds more than fair promise for one at a later date.

All of the forms now described may be identified by the characteristic head pattern or the color of the head of the later instars. For this the moulted head capsule is adequate.

It will be found that the larvæ may be divided into two groups, those with a color pattern on the head and those without. The patterns are sufficiently constant within the species to enable one to separate them by referring to Plate IX. *Polites baracoa* and *Poanes radians* may further be identified by the color pattern on the anal plate. *Catia misera* is characterized by dark ferruginous mottling. In this respect it closely resembles *Catia otho*. Two species are known in which the head lacks any definite pattern. One, *Calpodes ethlius*, may be distinguished by its dark orange head; *Hylephila phyleus*, the other, by its dark brown to black head.

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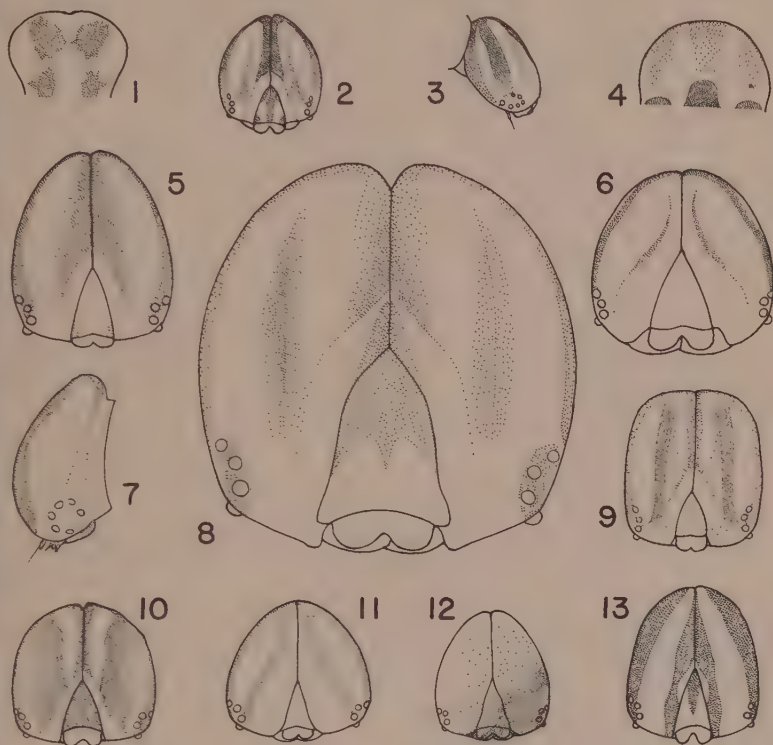


Fig. 1. Color pattern on the dorsal side of the anal segment of *Poanes radians* (Lucas).

Fig. 2. Front view of the head of *Lerodea eufala* (Edwards).

Fig. 3. Lateral view of the same.

Fig. 4. Color pattern on the dorsal side of the anal segment of *Polites baracoa* (Lucas).

Fig. 5. Front view of the head of *Lerodea tripuncta* (Herrich-Schäffer). Last instar.

Fig. 6. Front view of the head of *Prenes nero sylvicola* (Herrich-Schäffer). Fourth instar.

Fig. 7. Lateral view of the head of *Poanes radians* (Lucas). Fourth instar.

Fig. 8. Front view of the head of *Prenes nyctelius coscinia* (Herrich-Schäffer). Last instar.

Fig. 9. Front view of the head of *Poanes radians* (Lucas). Fourth instar.

Fig. 10. Front view of the head of *Polites baracoa* (Lucas). Fourth instar.

Fig. 11. Front view of the head of *Prenes nero sylvicola* (Herrich-Schäffer). Third instar.

Fig. 12. Front view of the head of *Hylephila phyleus* (Drury).

Fig. 13. Front view of the head of *Catia misera* (Lucas). Fourth instar.

NEW WEST INDIAN BUPRESTID BEETLES

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This paper is the result of a study of the beetles of the family Buprestidæ from the West Indies, sent to me for identification from the Museum of Comparative Zoölogy, Cambridge, Mass., by Dr. P. J. Darlington, Jr. All the new species described in this paper were collected by Dr. Darlington on his numerous trips to these islands.

Paratyndaris antillarum, new species

Short, robust, subcylindrical, rather strongly shining; body above and beneath piceous, with distinct purplish and greenish reflections in different lights.

Head feebly, uniformly convex, without a median depression; surface rather densely, coarsely, uniformly punctate, with a few very short, inconspicuous hairs, the intervals smooth; clypeus broadly, rather deeply, arcuately emarginate in front; antennæ missing.

Pronotum strongly, uniformly convex, one-third wider than long, distinctly narrower at apex than at base, widest at middle; sides strongly arcuately rounded; lateral margin, when viewed from the side, entire, and slightly arcuate; anterior margin truncate; base vaguely, transversely sinuate; disk without depressions or smooth lines; surface finely, transversely striolate, and asperate at middle, coarsely, rather densely punctate, and more or less rugose toward the sides, sparsely clothed with short, inconspicuous hairs. Scutellum glabrous, elongate-triangular.

Elytra as wide as pronotum at base; sides nearly parallel from humeral angles to behind middle (feebly constricted along basal fourth), then arcuately converging to the tips, which are separately broadly rounded, with a distinctly ele-

vated, sinuate, preapical carina; lateral margins coarsely, irregularly serrate; disk uneven, and each elytron with a transverse depression along base, an oblique depression in front of middle, and a feeble, median gibbosity at apical third; surface irregularly striate, coarsely, irregularly punctate, more densely basally, and sparsely, irregularly clothed with moderately long, recumbent, whitish hairs.

Abdomen beneath coarsely, rather sparsely, uniformly punctate, sparsely clothed with very short, inconspicuous hairs; second sternite with the posterior margin truncate, without a distinct plate extending over the third sternite; last visible sternite terminating in an acute spine.

Length 7 mm., width 3 mm.

Type locality.—South side of Lake Enriquillo, Dominican Republic.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,696. Paratype in the United States National Museum.

Described from two specimens (one type) found dead at the type locality during September 1938 by P. J. Darlington, Jr.

The type is probably a female but has not been dissected. Both specimens are more or less broken and the head is missing from the paratype. The paratype has a very small plate at posterior margin of second sternite.

This is the first species of *Paratyndaris* to be recorded from the West Indies. It resembles *P. acaciæ* Knull, but differs from that species in being shorter and more robust, in having the elytra uneven, uniform in color, and the lateral margin without two distinct teeth near apex, the second sternite without or with only a feebly indicated plate at the posterior margin, and in not having the pronotum sulcate at the middle.

***Buprestis hispaniolæ* new species**

Female.—Broadly elongate, moderately convex above, strongly shining; pronotum brownish cupreous, with a more or less distinct greenish reflection, and ornamented with reddish yellow as follows: A rather broad vitta on each side along lateral margin extending from apical angle to near

posterior angle, a narrow fascia on each side on anterior margin, three round spots along base, and a rounded spot at middle near anterior margin; elytra purplish brown, each elytron with two broad, irregular, reddish-yellow vittæ, the lateral one extending from humeral angle to near apex, and the sutural one from near base to apical fifth; body beneath brownish cupreous, with the prosternum, median parts of metasternum and mesosternum, femora in part, and transverse fasciæ on the sternites, reddish yellow.

Head nearly flat, purplish brown, with a transverse yellow spot on each side at vertex and several irregular yellow spots behind the clypeus, and with a short carina on the front; surface coarsely, irregularly, confluent punctate, sparsely clothed with short, erect, inconspicuous hairs; eyes feebly converging above; clypeus broadly, arcuately emarginate in front.

Pronotum twice as wide as long, distinctly narrower at apex than at base, widest near base; sides sinuate and strongly, obliquely diverging from apical angles to near posterior angles, which are broadly rounded; anterior margin broadly, arcuately emarginate, with the median lobe broadly, feebly rounded; base transversely sinuate; surface slightly uneven, coarsely, deeply, irregularly punctate, with a few short, inconspicuous hairs at posterior angles, the intervals smooth. Scutellum quadrate, truncate in front, broadly rounded behind.

Elytra slightly wider than base of pronotum; sides feebly expanded behind the humeri, feebly converging to apical third, then strongly, arcuately converging to the tips, which are separately transversely truncate, with a small tooth at each angle; surface striato-punctate, the striæ not deeply impressed, the punctures fine and closely placed in the striæ; intervals feebly convex, coarsely, irregularly punctate, and the intervals toward the sides more or less rugose.

Abdomen beneath coarsely, irregularly punctate, sparsely clothed with short, semierect, white hairs, the intervals obsoletely granulose; first sternite longitudinally flattened at middle; last visible sternite sinuately rounded at apex. Prosternum coarsely, sparsely punctate, sparsely clothed with short, recumbent, whitish hairs; prosternal process

flattened at middle, obliquely expanded from anterior coxal cavities to the apex, which is acute.

Length 18-20 mm., width 7-7.5 mm.

Male.— Unknown.

Type locality.— Between Constanza and Jarabacoa, at an altitude of 2,000 to 4,000 feet, Dominican Republic.

Type.— In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,697. Paratype in the United States National Museum.

Described from two females (one type) both collected by P. J. Darlington, Jr. The type was collected at the type locality during August 1938, and the paratype was collected in the foothills of the Cordillera Central, south of Santiago, Dominican Republic, during June 1938.

This species resembles *Buprestis lineata* F., but it differs from that species in having the pronotum and underside of body ornamented with reddish-yellow spots. The reddish-yellow spots on the underside of the body in the two specimens examined are more or less variable in shape.

***Peronæmis insulicola*, new species**

Male.— Rather narrowly agriliform, rounded in front, more acuminate behind, glabrous, rather strongly shining; head bluish green in front, becoming violaceous on occiput; pronotum dark green, with a more or less distinct violaceous tinge on certain parts; elytra dark violaceous green, bronzy green along sutural margins; body beneath green, with a golden reflection on abdomen, more strongly shining than above, and the legs in part bluish green.

Head nearly flat in front, with a vague, longitudinal carina on occiput; surface coarsely, deeply, densely, uniformly punctate, the intervals finely granulose; clypeus wide between the antennal cavities, feebly, transversely concave, broadly, shallowly, angularly emarginate in front.

Pronotum rather strongly convex, strongly deflexed at sides, one-third wider than long, slightly wider at base than at apex, widest at middle; sides feebly, arcuately rounded; anterior margin feebly sinuate, with a feeble, broadly rounded, median lobe; base nearly transversely truncate; lateral margin when viewed from the side sharply defined,

arcuate, extending from base to near apical angle; disk with three large, deep, basal depressions, the median one not extending to middle, with a deep fovea in front of scutellum, the lateral ones extending to middle of pronotum; surface coarsely, deeply, densely, uniformly punctate, the intervals finely, densely granulose. Scutellum twice as wide as long; sides feebly rounded; surface nearly smooth.

Elytra as wide as pronotum at base; sides broadly, angularly expanded behind humeral angles, nearly parallel to middle, then strongly, obliquely converging to the tips, which are acute; lateral margins coarsely, irregularly serrate; basal depressions rather deep and broadly transverse; surface irregularly striato-punctate, more or less rugose basally, the intervals finely, densely granulose, with a few coarse punctures intermixed.

Body beneath coarsely, rather densely, irregularly punctate, finely granulose, sparsely clothed with moderately long, erect, inconspicuous hairs; last visible sternite feebly, arcuately emarginate at apex.

Length 10 mm., width 3.25 mm.

Female.—Unknown.

Type locality.—Between Constanza and Jarabacoa, at an altitude of 2,000 to 4,000 feet, Dominican Republic.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,698.

Described from a unique male collected at the type locality during August 1938 by P. J. Darlington, Jr.

This species is allied to *Peronæmis monticola* Fisher, but it differs from that species in being of a more uniform color above, in having the pronotum rounded at the sides, the elytra strongly angulated behind the humeral angles, and in not having a finely punctured vitta along the sutural margins of the elytra.

***Enbrachys gibbipennis*, new species**

Male.—Ovate, nearly twice as long as wide, broadly rounded in front, more attenuate posteriorly, strongly shining, glabrous; head and pronotum green, more or less bronzy, the latter with the elevated median part piceous; elytra uniformly piceous; body beneath piceous, with an indistinct purplish tinge.

Head moderately convex, broadly, longitudinally depressed in front, with a narrow, longitudinal groove extending from clypeus to middle of front, deeply, narrowly, transversely depressed behind clypeus, with three deep foveæ in the depression, one median and two lateral; surface densely, coarsely granulose, with numerous coarse, shallow punctures intermixed; antennal cavities nearly contiguous in front.

Pronotum nearly three times as wide as long at middle, considerably narrower at apex than at base, widest near base; sides parallel along basal third, then strongly, obliquely converging to the apical angles, which are acute; posterior angles subrectangular; when viewed from the side the lateral margin is straight anteriorly, arcuate near posterior angle for the reception of the anterior leg; anterior margin deeply, broadly, arcuately emarginate; base transversely sinuate on each side, the median lobe strongly produced, and broadly truncate in front of scutellum, disk with the antero-median part strongly, transversely convex, narrowly flattened along base, and very broadly flattened and uneven at the sides; surface coarsely, sparsely punctate on convex median part, densely granulose, with a few coarse punctures intermixed on the flattened areas. Scutellum triangular, distinctly wider than long.

Elytra nearly as wide as pronotum at base; humeral angles broadly rounded; sides parallel from humeral angles to middle, then obliquely converging to the tips, which are conjointly broadly rounded; lateral margins feebly serrate; surface very uneven, coarsely, sparsely, shallowly, irregularly punctate, and each elytron with moderately elevated, broadly rounded gibbosities as follows: An oblique one on humerus, an elongate one along sutural margin behind scutellum, a rounded one near lateral margin just behind the middle, and an elongate one near apex.

Abdomen beneath vaguely granulose or reticulate, with a few shallow, inconspicuous punctures intermixed; last visible sternite broadly rounded at apex, the apical groove deep, and following outline of lateral margins. Prosternum feebly reticulate, sparsely, coarsely, shallowly punctate; prosternal process broad, the sides obliquely converging to the apex, which is broadly rounded.

Female.— Differs from the male in being uniformly piceous, with a more or less distinct cupreous reflection, and in having the last visible sternite more broadly subtruncate at apex.

Length 2.75 mm., width 1.5 mm.

Type locality.— Mt. Diego de Ocampo, at an altitude of 3,000 to 4,000 feet, Dominican Republic.

Type and allotype.— In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,699. Paratypes in the United States National Museum.

Described from four specimens, two males and two females (one male type), all collected at the type locality during July 1938 by P. J. Darlington, Jr.

This species resembles *Enbrachys otero* Fisher, from which it differs in having the front of the head more shallowly depressed, the sides of the pronotum more strongly flattened, and in not having the gibbosities on the elytra so abruptly elevated.

***Leioptleura darlingtoni*, new species**

Oblong, rather strongly convex above, broadly rounded in front, more strongly narrowed posteriorly; head yellowish cupreous; pronotum reddish cupreous on convex median part, bronzy green on flattened area at sides; scutellum bright blue; elytra opaque olivaceous green, with a quadrate, opaque, blue spot behind the scutellum, a large, shining, piceous area on each side along lateral margin behind humerus, and a similar area in front of scutellum, common to both elytra; body beneath black, with a faint purplish reflection, and strongly shining.

Head strongly, uniformly convex, with four deep, round foveæ behind the clypeus; surface densely, coarsely reticulate, with a few shallow, indistinct punctures intermixed; antennæ uniformly piceous, nearly contiguous at bases.

Pronotum twice as wide as long, distinctly narrower at apex than at base, widest along basal half, strongly, uniformly convex on antero-median part, strongly flattened along base and on each side along lateral margin; sides strongly, arcuately diverging from apical angles to middle, then parallel to the posterior angles; anterior margin subtruncate; base transversely sinuate on each side, the median

lobe feebly produced and broadly truncate in front of scutellum, surface coarsely, densely reticulate, with a few shallow, inconspicuous punctures intermixed. Scutellum triangular, nearly twice as wide as long, densely granulose, the granules flattened on top, resembling round, microscopic scales.

Elytra slightly wider than base of pronotum, rather strongly convex, broadly depressed along lateral margins behind humeri; humeral angles obtusely rounded; sides parallel and feebly sinuate from humeral angles to middle, then arcuately converging to the tips, which are conjointly broadly rounded, the lateral margins not distinctly serrate; humeri strongly elevated; surface densely granulose and sparsely, coarsely punctate on the olivaceous-green and bright-blue areas, the granules similar to those on the scutellum, and sparsely, coarsely punctate on the shining piceous areas.

Abdomen beneath densely, obsoletely reticulate, with a few inconspicuous punctures intermixed; last visible sternite broadly rounded at apex. Prosternum obsoletely reticulate, with a few coarse punctures intermixed, the groove for the insertion of the antenna short and shallow. Metasternum shallowly emarginate in front.

Length 2 mm., width 0.8 mm.

Type locality.—Labeled "R. Froide, Port-au-Prince, Haiti."

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,700.

Described from a single specimen collected at the type locality October 3, 1934, by P. J. Darlington, Jr., to whom I take great pleasure in dedicating the species.

This species differs from all the known species of *Leioptleura* in having the peculiar scale-like sculpture on the elytra and scutellum.

***Micrasta puertoricensis*, new species**

Male.—Oblong oval, equally rounded in front and behind, moderately shining, glabrous; uniformly black, with an indistinct bronzy tinge above; body beneath black, with a faint purplish reflection, the tarsi yellowish, with the tarsal lamellæ whitish.

Head feebly convex, when viewed from above forming a

regular arc with the pronotum; surface densely alutaceous, sparsely, coarsely, shallowly punctate; front with the sides parallel; clypeus not transversely depressed, feebly constricted between the antennal cavities, feebly, broadly emarginate in front. Antenna extending beyond base of pronotum, sparsely clothed with long, erect, whitish hairs; first and second segments globuse, subequal in length; third distinctly narrower, feebly expanded at middle, subequal in length to the second; the following segments rather robust, subequal in length, slightly triangular, the last segment longer than the tenth, and acute at apex.

Pronotum strongly, uniformly convex, feebly, transversely flattened along base, twice as wide as long, distinctly narrower at apex than at base, widest behind middle; sides strongly, arcuately converging anteriorly, slightly converging near posterior angles; when viewed from the side the marginal and submarginal carinæ feebly arcuate, widely separated for nearly their entire length, and united at base, the marginal carina more or less obsolete anteriorly; anterior margin feebly, arcuately emarginate; base transversely truncate; surface feebly alutaceous, sparsely, coarsely, shallowly punctate. Scutellum triangular, acute at apex.

Elytra as wide as pronotum at base; sides parallel from humeral angles to apical third, then arcuately converging to the tips, which are conjointly broadly rounded; humeri not prominent; disk uniformly convex, with a shallow, transverse depression at base of each elytron; surface feebly, sparsely punctate, the intervals nearly smooth.

Abdomen beneath feebly convex, feebly reticulate, vaguely punctate, clothed with a few short, erect, inconspicuous hairs; basal sternite with a round, median depression, which is densely clothed with long, erect hairs; last visible sternite broadly rounded at apex. Prosternum moderately convex, coarsely, sparsely punctate; anterior margin subtruncate; prosternal process broad, the sides parallel, and broadly truncate at apex. Femora moderately robust. Tibiæ straight and slender.

Length 1.25 mm., width 0.6 mm.

Type locality.—Maricao Forest, at an altitude of 2,000 to 3,000 feet, Puerto Rico.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,701. Paratype in the United States National Museum.

Described from two males (one type) collected at the type locality between May 30 and June 2, 1938, by P. J. Darlington, Jr.

This species resembles *Micrasta oakleyi* Fisher, but differs from that species in being uniformly black with an indistinct bronzy-green tinge, in having the marginal carina on the pronotum more or less obsolete anteriorly, the pronotum feebly, transversely depressed along the base, the scutellum acute at the apex, the surface of the elytra more feebly punctured, and in not having the clypeus transversely depressed.

***Micrasta subcylindrica*, new species**

Female.—Differs from *Micrasta puertoricensis* Fisher as follows: Elongate, subcylindrical, and strongly convex above, strongly shining, piceous; pronotum more coarsely punctured, widest at middle, with the sides arcuately rounded; head coarsely, sparsely punctate, feebly, longitudinally depressed at middle; scutellum longer than wide, acute at apex; each elytron with a broad, triangular depression at base; abdomen and prosternum coarsely, densely punctate, the basal sternite without a round, median depression clothed with long hairs (this is a male sexual character); and the tarsi and apical halves of tibiae yellowish.

Length 2 mm., width 0.75 mm.

Type locality.—Soledad (Cienfuegos), Cuba.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,702.

Described from a unique female collected during May 1936 by P. J. Darlington, Jr.

***Micrasta monticola*, new species**

Male.—Differs from *Micrasta puertoricensis* Fisher in being more robust, more strongly convex above, strongly shining, uniformly bronzy brown, and in having the pronotum and elytra coarsely, rather densely punctate, with the intervals smooth, pronotum widest along basal half, with the sides nearly parallel posteriorly, scutellum longer than

wide, and acute at apex, elytra with the sides parallel from humeral angles to middle, and each elytron with a distinct, rather broad, transverse groove at base, the last visible sternite broadly rounded at apex, and in having the intermediate sternites narrowly, transversely grooved at the middle.

Length 2 mm., width 1 mm.

Type locality.—Mt. Diego de Ocampo, at an altitude of 3,000 to 4,000 feet, Dominican Republic.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,703.

Described from a unique male collected during July 1938 by P. J. Darlington, Jr.

***Micrasta hispaniolæ*, new species**

Female.—Differs from *Micrasta monticola* Fisher in being uniformly bluish black, subopaque, in having the pronotum widest at the middle, with the sides arcuately converging posteriorly, and the surface rather densely, coarsely punctate, with the intervals distinctly alutaceous, and in having the sides of the elytra parallel from humeral angles to apical third. It also resembles *Micrasta puertoricensis* Fisher, but it differs from that species in being more robust, more strongly convex above, subopaque, in having the pronotum and elytra rather densely, coarsely punctate, with the intervals distinctly alutaceous, and in having a distinct, broad, transverse depression at the base of each elytron.

Length 2 mm., width 1 mm.

Type locality.—Foothills of the Cordillera Central, south of Santiago, Dominican Republic.

Type.—In the Museum of Comparative Zoölogy, Cambridge, Mass. Type no. 23,704.

Described from a unique female collected during June 1938 by P. J. Darlington, Jr.

It is just possible that this may be the female of *monticola* Fisher, but on account of the differences given and without additional notes on their habits it seems advisable to consider them to be two distinct species. There does not seem to be a good series of any of the described species of this genus available for study, so it is impossible to decide what variation occurs in the species.

CONCERNING CHLOROPERLA (PERLIDÆ)

BY NATHAN BANKS

Museum of Comparative Zoology.

Recently there has been discussion by Frison and Ricker, the latter quoting Claassen, as to whether this name should replace *Alloperla*. When I made the Classification of the Perlidae in 1906, I had no European collection, and there was then no literature on the European forms of prime value. So I accepted Hagen's use of *Isopteryx* based on the lack of a folded anal area to the hind wing which is true for our form that he identified as *cydippe* Newm. I showed that the genus *Chloroperla* should replace *Isopteryx*. Since then I have not treated this group, but others have. Enderlein in 1909 applied my classification to the European and exotic forms known to him. Seeing that some of the European species had a small anal area, he wisely used another and more definite character, the fact that the second anal vein of the fore wings is unbranched in all the species, except *I. serricornis*, for which he made a new genus, *Isoptena*.

In 1912 Okamoto in his revision of the Japanese Plecoptera also uses this unforked second anal as the character of *Chloroperla*. In 1936 Kimmins reviewed the facts concerning *Chloroperla* and *Isopteryx* and agreed with me that the latter is a synonym of the former. He lists three species of *Chloroperla* in the British fauna, *torrentium*, *tripunctata*, and *apicalis*. The first two have a small anal area to hind wings, the third lacks it. So Kimmins evidently is using the unforked second anal as the generic character. But Needham, Claassen, Frison, and Ricker seem unaware that the unforked second anal has ever been used as the generic character, although they list Enderlein's paper in their bibliographies. Moreover, Needham and Claassen in their description of *Chloroperla* state that the second anal is branched, and put it under this heading in their synoptic table; however, their figure on Plate 14 shows the second

anal unbranched. It was doubtless this mistake that led Ricker to describe his *Hastaperla*. Using the unbranched second anal vein as the generic character, our species (*brevis*) belongs to *Chloroperla* as truly as *apicalis* and *tripunctata*.

In 1912 when I saw the type of *C. cydippe* Newm. I noted it had a small anal area with one longitudinal vein; recently Ricker has seen it and says the second anal is forked, so this species is doubtless an *Alloperla*.

Kimmins considers that the genotype of *Chloroperla* (*lutea* Latr. is a synonym of *tripunctata*. I cannot agree. Latreille says of *lutea*, "extrémité des antennes noires"; and Newman says of *apicalis*, "extreme portions of the antennæ intensely black". Neither mention any black border to the pronotum.

Scopoli does not mention antennæ in his description of *tripunctata*, which, he says, agrees except in some points with *grammatica*. Of *grammatica* he says, "antennæ basi flavæ, extrorsum fusæ". Klapalek in *Süsswasserfauna Deutschlands* (1909) says for *tripunctata* that the basal third of the antennæ is yellow, rest black, and that the pronotum is bordered with a black line.

In specimens here (Hagen coll.) *tripunctata* has mostly brown to black antennæ except basal third or less, while in *apicalis* (even specimens at least 90 years old) there is a greater part yellow and beyond "intensely black". Since *lutea* agrees with *apicalis* in both antennæ and pronotum and in neither with *tripunctata*, it is evident that *lutea* Latr. will replace *apicalis*. In either case *brevis* belongs to *Chloroperla*, and *Chloroperla* is distinct from *Alloperla*.

PSYCHE

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